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Report to the Secretary of Defense

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WEAPONS CODEVELOPMENT

U.S. National Issues in the MLRS Terminal Guidance Warhead Program

AO/NSIAD-92-55

GAO

United States
General Accounting Office
Washington, D.C. 20548

National Security and
International Affairs Division

B-243681

April 21, 1992

The Honorable Richard B. Cheney
The Secretary of Defense

Dear Mr. Secretary:

We reviewed the Army's Multiple Launch Rocket System (MLRS) Terminal Guidance Warhead (TGW) development program to determine how U.S. national interests are protected. The MLRS TGW program is a multinational cooperative development effort begun under a 1983 Memorandum of Understanding (MOU) signed by the United States, France, Germany, and the United Kingdom. Specifically, we reviewed MOU provisions and other arrangements regarding cost share/work share, technology transfer, data rights, termination provisions, financial arrangements, and third country transfers. Some of these factors should be considered in deciding whether to continue the MLRS TGW program and in negotiating future MOUs. We reported previously on MLRS TGW requirements, schedule, performance, and cost.[1]

The program is to develop a target-sensing submunition and warhead for attacking armored targets at distances up to 30 kilometers or more. The United States is to pay 40 percent of the development cost of MLRS TGW while each of the other participating nations is to contribute 20 percent. The MLRS TGW Joint Venture consisting of MDTT, Inc., Martin Marietta Corporation (United States), Diehl GmbH and Company (Germany), Thomson CSF (France), and THORN EMI Electronics Ltd. (United Kingdom) are the five contractors performing the program. MDTT, Inc., an internationally staffed corporation wholly owned by the four national prime contractors, is the managing partner for the Joint Venture. The project management office for the international effort is located at the U.S. Army Missile Command, Huntsville, Alabama.

[1]Defense Acquisition: U.S.-German Examinations of the MLRS Terminal Guidance Warhead Program (GAO/NSIAD-92-7, Oct. 31, 1991) and Defense Acquisition: Examination of MLRS Terminal Guidance Warhead Program (GAO/NSIAD-91-144, Mar. 28, 1991).

Results in Brief

Despite the U.S. cost share of 40 percent, the MOU limits the U.S. development work share under the prime contract to a maximum of 34 percent. In another measure of work share, the development tasks assigned to the United States were rated by MDTT to have a relative quality value of 22.8 percent of the total quality development work, lowest of the four participating countries.

Although the MOU provision governing exchange rates has favored the United States, some provisions could prove costly, and others may not adequately protect U.S. interests. For example:

- To apply MLRS TGW-related limited rights data to other weapons development programs, the United States would have to pay the contractors—beyond the MLRS TGW development costs—for use of the data.[2]
- If the United States announced its intention to withdraw from the development effort, it would be obligated to continue funding the program for 270 days.[3]
- Partner nations, which are developing most of the components, may unilaterally transfer technical data that have been developed in their own countries to third countries without the approval of the United States or other partner nations. This provision contrasts with the MOU provisions for the basic MLRS program, which requires all such transfers to be approved unanimously.[4]

Under the MOU, if a country introduces a new technology during the MLRS TGW development phase, it could be required to provide the technology to the partner nations. This provision could affect a separate U.S. development effort, the Microwave Millimeter Wave Monolithic Integrated Circuit (MIMIC). Although Department of Defense officials have stated that MIMIC design and manufacturing technology should not be released to foreign countries, the Army Missile Command is considering introducing MIMIC hardware to enhance the MLRS TGW program. If this technology were introduced during the MLRS TGW development phase, the MOU provision

[2]Defense Department officials stated that this provision reflects common practice with technical data rights in weapons development programs.

[3]This provision would apply to any of the partner nations seeking to withdraw from the program.

[4]The 1983 MOU governing the MLRS TGW development program was a supplement to the basic MOU that established the MLRS cooperative program in 1979.

could require the United States to transfer design and manufacturing technology to the partner countries as well. According to project officials, they intend to require a waiver of these provisions before MIMIC is introduced.

Background

MLRS is an all weather, indirect fire system with up to 12 rockets. The objective of the MLRS TGW program is to develop a target-sensing submunition for attacking armored targets at extended range. The submunition is to be an all-weather weapon that will use the standard MLRS rocket motor to propel a warhead to the target area where the warhead will dispense three terminally guided submunitions. Each submunition will contain a seeker that is to activate the submunition's independent guidance and control functions and search for and engage the target. The submunitions will rely on miniaturized, sophisticated, and complex components to perform these functions. The most recent validated Army estimate (September 1989) shows the total U.S. acquisition cost (development and production) for the MLRS TGW program to be $7 billion.

Congress directed that MLRS TGW and two other target-sensing submunitions be reviewed and that a single option be selected. The Department of Defense selected another system in March 1991. However, U.S. participation in MLRS TGW continues through the congressionally approved use of reprogrammed Defense Department funds. In addition, the Defense Department's appropriation for fiscal year 1992 included $46.8 million for completing the current development phase of the program. The program is currently in the system demonstration substage of development and is scheduled for a full-scale development decision in late 1992. There are indications that the United States will not continue into full-scale development.

United States Has Highest Cost Share but Lower Quality Work Share

Under the MOU provisions, the United States is to pay 40 percent of the program development cost, and France, Germany, and the United Kingdom are each to pay 20 percent. The U.S. cost share pays for

- the development work of the U.S. national prime contractor, Martin Marietta, and the U.S. subcontractor, TRW;
- the integration work of LTV;
- 34 percent of the costs (largely managerial expenses) of the managing contractor, MDTT;
- the fees (profit) charged by the U.S. contractors in the program;

- all testing within the United States;
- the technical support of Defense Department labs; and
- the cost of the international program management office at the U.S. Army Missile Command.

On the basis of a September 1991 Defense Department estimate, the development program will have cost a total of about $660 million (U.S. share—$300 million; European share—about $360 million) by the end of the system demonstration substage. At that time, the United States will have paid about 45 percent of the development costs when calculated in then-year dollars. When the projected costs are calculated using 1984 exchange rates and baseline economics in accordance with the provision of the MOU,[5] the U.S. cost share may be somewhat less. According to a project office official, to return the cost share to the MOU prescribed levels, the MLRS TGW project office intends to direct MDTT to move development work (and therefore cost share) to the European partners during the maturation/full-scale development stage. However, the United States may withdraw from the program at the end of the system demonstration substage. If the United States does withdraw, this correction will not be implemented, and the United States will have sustained a greater share of the cost than required by the MOU.

Although the United States is to pay 40 percent of the program costs, the MOU limits the development work to be done in the United States under the prime contract to a maximum of 34 percent of the total development work (determined by the cost of the work).[6] At the beginning of the program, the quality development work was distributed with the intent of equal quality work shares despite the unequal distribution of the costs. An MDTT work share quality rating system shows the United States having 22.8 percent of the quality work, France 25.3 percent, Germany 26.1 percent, and the United Kingdom 25.8 percent. The scope of MDTT's rating included (1) requirements and interface tasks, (2) design and development tasks, and (3) integration, assembly, and test tasks. The factors MDTT used to measure work quality were

- the status of the technology relative to "state-of-the-art,"
- the uniqueness of the technology, that is, would it provide a "competitive edge,"

[5]See p. 9 for a detailed discussion of these provisions.

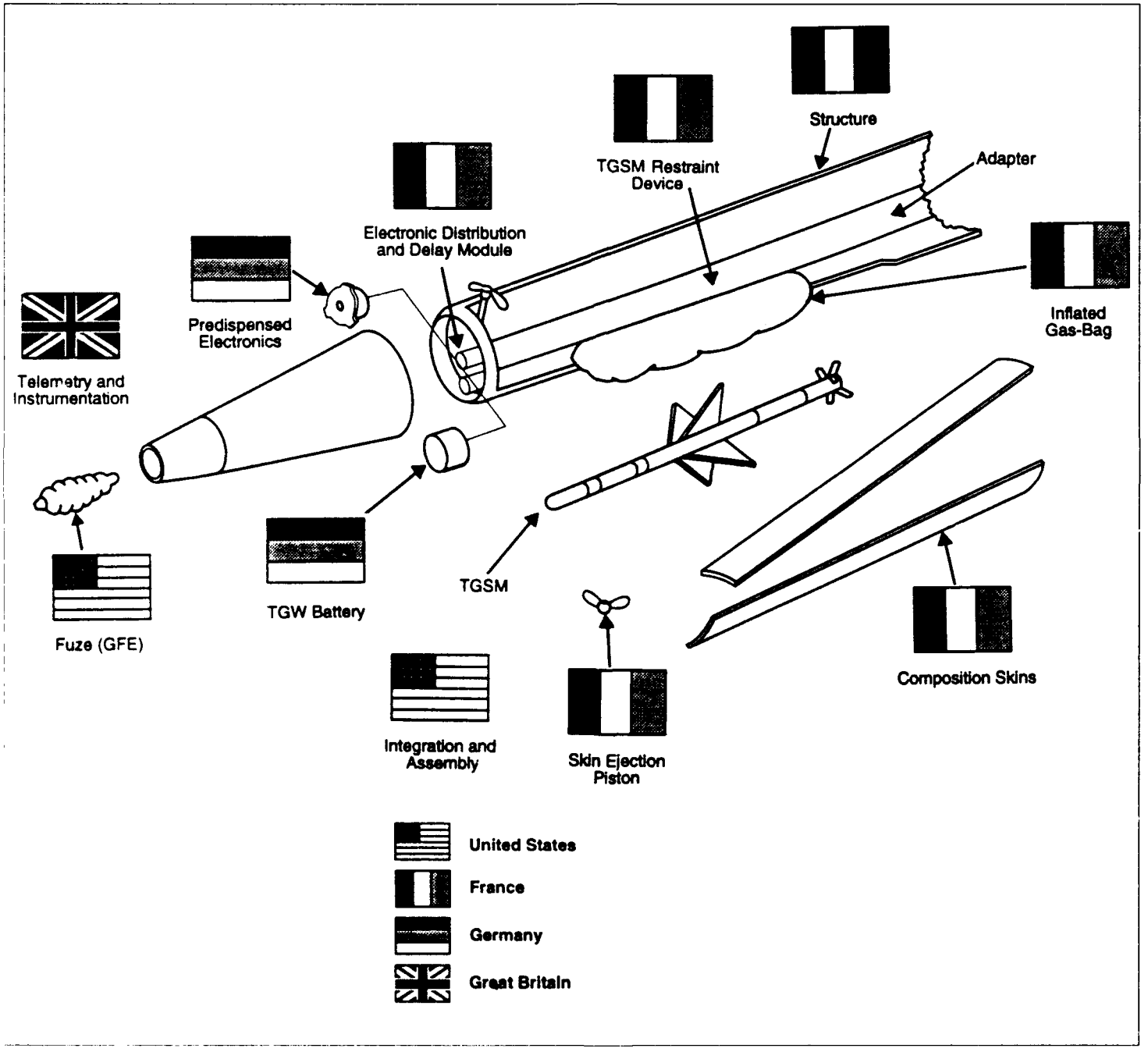
[6]Some additional work is being performed in the United States by LTV (integration into MLRS) and third-tier subcontractors to European contractors.

- the number of potential applications for the technology, and
- the value of potential applications (potential profit).

The U.S. work share is comprised of requirements formulation, radar transmitter and software algorithm development, and assembly and integration tasks. Figure 1 shows the division of development work for the MLRS TGW warhead, and figure 2 shows the division of development work for the terminally guided submunition.

All contractors' fees (profit) were paid by the United States and were counted toward its cost share until May 1991. According to a project office representative, at that time France and the United Kingdom began paying the fees for development work done in their countries. The German government has also agreed to begin paying the fees for work done in Germany but has not yet begun to do so.

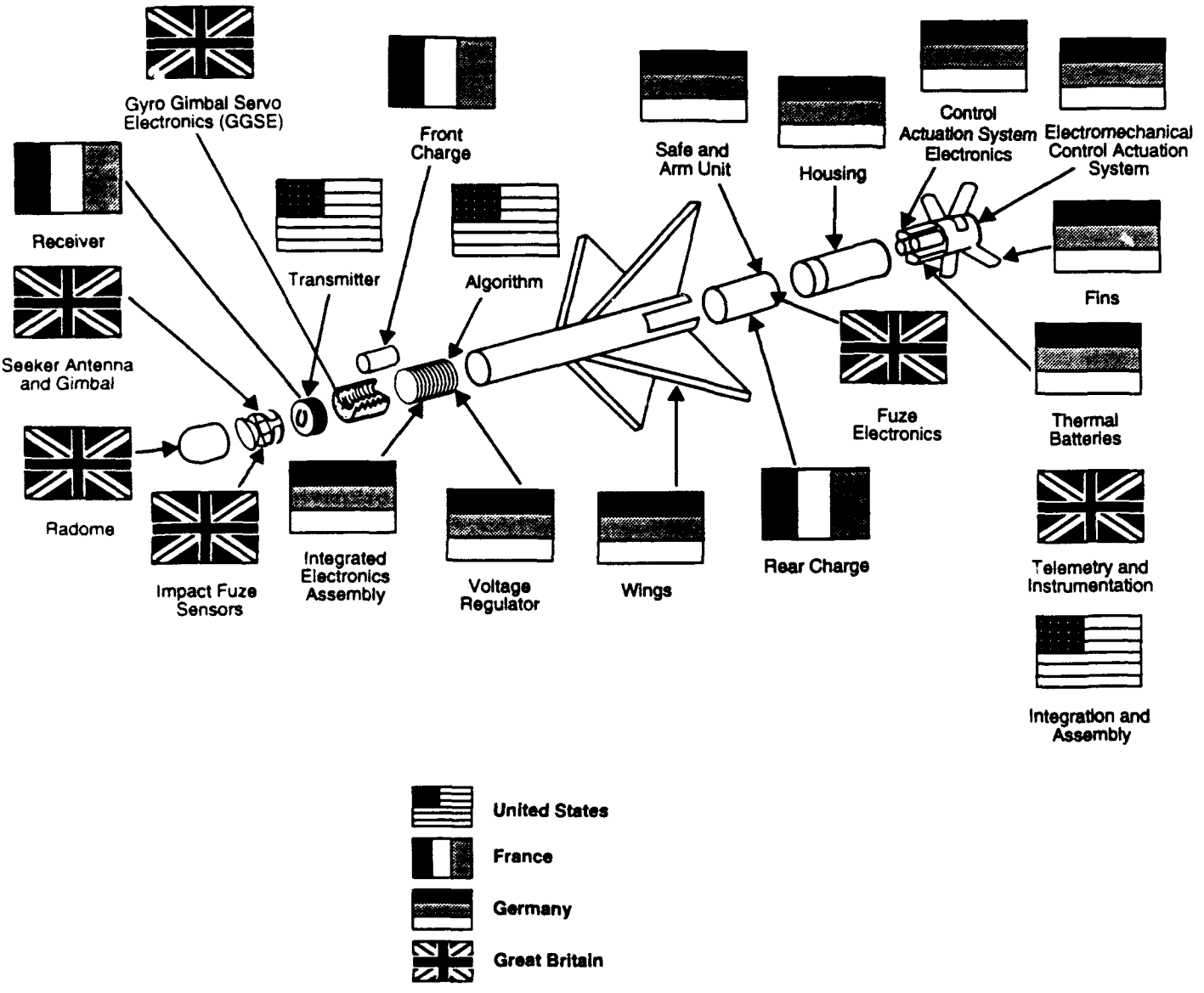
Figure 1: MLRS Terminal Guidance Warhead



Source: MDTT, Inc.

Note: GFE is government-furnished equipment and TGSM is terminally guided submunition.

Figure 2: MLRS Terminally Guided Submunition



Source: MDTT, Inc

MOU Provisions on Technical Data Rights and Termination Could Prove Costly

A significant number of the MLRS TGW technologies involve the use of "background limited rights data," which are data that the contractors claim they own and have brought into the development program. If the Defense Department wants to apply the data outside the MLRS TGW program, and the claims are validated, the contractors may require payment of nonrecurring fees or recurring royalties for use of the data. One of the 92 MLRS TGW limited rights data claims made as of May 23, 1991, has been reviewed by the Army. That claim—relating to the submunition gyroscope—was validated.[7] In that case, the contractor reserved all U.S. production of these gyroscopes for itself and required a royalty of 20.5 percent through March 1994 for any gyroscopes produced in the other partner nations.[8] The contractor did not grant an option to use the gyroscope in programs other than the MLRS TGW, which would require additional negotiations with the contractor. Depending on the outcome of the negotiations, the United States could incur costs in addition to those incurred in the MLRS TGW development program. Defense Department officials told us that the limited rights data provisions of the MLRS TGW program reflected standard practice Nevertheless, decisionmakers should be aware of the potential cost implications when considering the application of the data to other missile systems.

The MOU provision on termination also could prove costly if U.S. participation in the program is terminated before completing the system demonstration substage. Under the agreement, after a government announces its withdrawal, if the other partner nations decide to continue the program, the terminating government is obligated to continue paying its share of the development effort for 270 days. This issue was raised during congressional consideration of the Defense Department's reprogramming request to continue the MLRS TGW system demonstration substage. The Department calculated that terminating U.S. participation at that time would have cost the United States $36.4 million. This provision was included in the MOU to limit the cost and schedule risk to the partner nations from a country suddenly dropping out of the program.

[7]According to Defense Department officials, each claim is reviewed on an as-needed basis and involves a legal and technical examination into whether or not the contractor has a valid legal claim of ownership of the technology in question.

[8]This royalty would decline over time to a minimum of 17 percent.

MOU Exchange Rate Provisions Have Favored the United States

The exchange rates and the economic baseline for the MLRS TGW development program are fixed by the MOU at January 31, 1984, levels.[9] The MOU provides for changing these reference conditions only at transition to the program's maturation/full-scale development stage (projected for 1993). Even though the U.S. dollar has declined relative to the European currencies since 1984, the U.S. contribution of 40 percent is still valued using 1984 exchange rates. In addition, all development costs are to be defined in constant 1984 U.S. dollars, including expenses that have been incurred in foreign currencies and paid for by the foreign governments as their cost shares. Since the European partners have to translate their expenses back to the 1984 exchange rates, their cost share contributions appear understated. The European partners have sought relief from these exchange rates and the baseline economics since April 1988. The Army did not accede to the European requests, and as a result, avoided increases in U.S. payments.

In December 1990, the partner nations agreed to adjust the baseline economics and exchange rates when the program enters the maturation/full-scale development stage, which is projected for 1993. The baseline economics will be changed to January 1990 levels. The exchange rates to be applied during the maturation/full-scale development stage will be an average of the actual exchange rates from January 1, 1980, to December 31, 1989. In effect, due to these adjustments the United States, France, and Germany will cover the cost of British inflation, and the United States will cover the cost of the decline in the value of the U.S. dollar if the program proceeds to full-scale development. According to the project office, the new rates could increase the cost of the U.S. development share by about $21.8 million (fiscal year 1990 constant dollars).

Third Country Transfer Provisions May Not Adequately Protect U.S. Interests

The MOU may not adequately protect U.S. interests in the transfer of technical data to countries outside the four partner nations. According to the MOU, if a particular technology is the result of MLRS TGW work in a single country, that country has the right to sell or transfer the technology to a third country outside the partner nations. Such a transfer from one of the European partner nations could be accomplished without the agreement of the United States or the other partners. Since most of the technologies are being developed in single European countries, the United

[9]The economic baseline reflects the value of a particular currency for any given year. Changes to the economic baseline would take into account inflation or deflation a particular country has experienced over the time period in question.

States will not have a voice in possible decisions to transfer much of the technical data to third countries. This agreement contrasts with the provisions of the MOU for the basic MLRS program, which requires all transfers of technical data to be approved unanimously by the partner nations.

MOU Could Require Release of Technology If MIMIC Is Introduced

MIMIC technology is being developed in a Defense Department program for application to smart munitions, radars, electronic warfare suites, and communication systems. The technology will reduce the size, weight, and cost of microwave circuit "chips" and will increase their performance and reliability. According to the MIMIC program manager and Defense Technology Security Administration officials, MIMIC design and manufacturing technology should not be transferred to foreign countries due to national security and competitiveness concerns. Nevertheless, these officials believe sales of U.S.-produced MIMIC hardware to reliable allies are acceptable. However, under paragraph 7.3.2 of the development MOU, if government-owned technology is introduced to the MLRS TGW development program, the introducing nation could be required to provide the technology to the other partner nations. This provision follows and supports the MOU objective (paragraph 7.2) of transferring technical information to enable each of the partner nations to produce MLRS TGW, its subsystems, and components.

To enhance the success of the MLRS TGW program, the U.S. Army Missile Command (the Fire Support Program Executive Office, the MLRS project office, and the Manufacturing Technology Division) is considering introducing MIMIC technology to elements of both U.S. and French work share before the end of the development phase. These offices intend only to allow MIMIC-based hardware to be transferred at this time, as opposed to design and manufacturing technology. However, if MIMIC hardware were introduced into the MLRS TGW development program, the MOU (paragraphs 7.2 and 7.3.2) could also require the transfer of MIMIC design and manufacturing technology to all of the partner nations. MLRS TGW project office officials have said that before MIMIC is introduced, they intend to require a waiver of these MOU provisions.

Given the concerns expressed within the Defense Department about transferring MIMIC design and manufacturing technology and the MOU requirements, we question whether the MIMIC hardware should be introduced in the MLRS TGW development program. If the United States terminates its participation in the MLRS TGW program at the end of the

system demonstration substage, and then sells U.S.-produced MIMIC hardware to the partner nations, the MOU provisions would not pose a concern since they would no longer govern U.S. participation. On the other hand, if the United States obtains an unanimously agreed upon waiver of these MOU provisions from the partner nations, introduction of MIMIC hardware may be acceptable during the development program.

Recommendation

We recommend that you direct the Army to withhold introduction of MIMIC technology to the MLRS TGW program until (1) the United States obtains a waiver of paragraph 7.3.2 of the MOU from all other participating nations, (2) the MLRS TGW development is completed, or (3) the United States terminates its participation under the development MOU. This action would insure that the provisions of the MLRS TGW development MOU governing the sharing of introduced government-owned technologies would not apply to MIMIC.

Agency Comments and Our Evaluation

We obtained written comments on a draft of this report from the Department of Defense. The Defense Department disagreed with our conclusion that the third country transfer provisions of the MLRS TGW MOU may not adequately protect U.S. interests. It stated that the millimeter wave transmitter is the most unique component of the TGW program and pointed out that it is being developed in this country, and that the United States would have unilateral control over the transfer of this technology to third countries. We agree that the United States will have control over the transmitter. However, a number of missile technologies are being developed in the partner nations, such as the folding submunition wings and the compact assembly of printed circuit boards. These technologies could be transferred to third countries without the agreement of the United States.

The Defense Department also disagreed with our conclusion that the MOU could require the transfer of MIMIC technology to the partner nations if it were introduced to the MLRS TGW development program. It stated that the MOU provides the United States with the discretion to only release the technology if it agrees the technology "to be necessary for the development project and the establishment and utilization of the required production capabilities." However, a MIMIC program official has stated that a portion of the French work share "is not producible" without MIMIC since its manufacture will be very time consuming, difficult, and costly. Further, the Defense Department agreed that a decision to introduce MIMIC

technology should be preceded by an unequivocal acknowledgement from the partner nations that design and manufacturing technology will not be transferred.

In regard to the other sections of this report, the Department stated that any MOU is a compromise between the parties involved. It stated that if the United States insisted on having the advantage on every issue during MOU negotiations, few, if any, international development programs would be initiated with the United States as a partner. We recognize this and have pointed out that MOU provisions act both to the benefit and detriment of U.S. interests. Our information is provided so that it might be considered in future MOU negotiations.

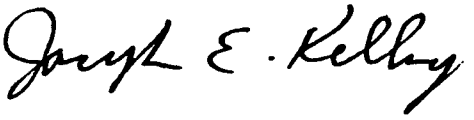
The complete text of the Defense Department's comments and our response to those comments are contained in appendix II.

As you know, 31 U.S.C. 720 requires the head of a federal agency to submit a written statement on actions taken on this recommendation to the Senate Committee on Governmental Affairs and the House Committee on Government Operations not later than 60 days after the date of the report and to the House and Senate Committees on Appropriations with the agency's first request for appropriations made more than 60 days after the date of the report.

Our scope and methodology are contained in appendix I. We are sending copies of this report to various congressional committees and the Director, Office of Management and Budget. Copies will be made available to others on request.

Please contact me at (202) 275-4128 if you or your staff have any questions concerning this report. The major contributors to this report are listed in appendix III.

Sincerely yours,



Joseph E. Kelley
Director, Security and International
Relations Issues

Contents

Abbreviations

MIMIC	Microwave Millimeter Wave Monolithic Integrated Circuit
MOU	Memorandum of Understanding
MLRS	Multiple Launch Rocket System
TGW	Terminal Guidance Warhead

Scope and Methodology

We examined the Memorandum of Understanding (MOU) and the implementing arrangements for the Multiple Launch Rocket System (MLRS) Terminal Guidance Warhead (TGW) program to determine whether and how U.S. interests are protected, particularly in the areas of cost share/work share, technology transfer, data rights, termination provisions, financial arrangements, and third country transfers. We also reviewed other relevant documents, including MLRS TGW development contract, contractor work share assignments, MLRS TGW master technology list, and minutes of the MLRS TGW Joint Steering Committee and Executive Management Committee meetings. We interviewed officials from the offices of the Under Secretary of Defense for Acquisition, the U.S. Army, the Defense Technology Security Administration, and the Defense Advance Research Projects Agency in Washington, D.C., the U.S. Army Missile Command, Huntsville, Alabama, and MDTT, Inc., Orlando, Florida.

We obtained written comments on a draft of this report from the Department of Defense and incorporated the comments where appropriate. We conducted our review from November 1990 through November 1991 in accordance with generally accepted government auditing standards.

Comments From the Department of Defense

Note: GAO comments supplementing those in the report text appear at the end of this appendix.

See p. 12

OFFICE OF THE UNDER SECRETARY OF DEFENSE

WASHINGTON, DC 20301-3000

24 FEB 1992

ACQUISITION

Mr. Frank C. Conahan
Assistant Comptroller General
National Security and International
Affairs Division
U.S. General Accounting Office
Washington, D.C. 20548

Dear Mr. Conahan:

This is the Department of Defense response to the General Accounting Office (GAO) draft report, "MULTINATIONAL WEAPONS DEVELOPMENT: U.S. National Issues in the MLRS Terminal Guidance Warhead Program," Dated January 8, 1992 (GAO Code 463803), OSD Case 8652-B. The DoD partially concurs with two findings and nonconcurs with two findings. With respect to the recommendation, the DoD partially concurs.

It is emphasized that, by necessity, any Memorandum of Understanding is a compromise of terms and conditions that have been agreed to be acceptable by all parties involved. While some of the provisions of the Memorandum of Understanding may be perceived to favor the European partners, other provisions, such as the 1984 exchange rate and economic baseline, have favored the U.S. The tone of the GAO report implies that the U.S. was negligent in negotiating the Memorandum of Understanding. However, if the U.S. insisted on having the advantage on every issue during Memorandum of Understanding negotiations, few, if any international development programs would be initiated with the U.S. as a partner.

The detailed DoD comments in the report findings and recommendation are provided in the enclosure. The Department of Defense appreciates the opportunity to provide comments on the draft report.

Sincerely,

Frank Kendall
Chairman
Conventional Systems Committee

Enclosures
A/S

**GAO DRAFT REPORT - DATED JANUARY 8, 1992
(GAO CODE 463795) OSD CASE 8652-B**

"MULTINATIONAL WEAPON DEVELOPMENT: U.S. NATIONAL ISSUES IN THE MLRS TERMINAL GUIDANCE WARHEAD PROGRAM"

DEPARTMENT OF DEFENSE COMMENTS

* * * * *

FINDINGS

o **FINDING A: Multiple Launch Rocket System Terminal Guidance Warhead Program Shares.** The GAO reported that the Multiple Launch Rocket System Terminal Guidance Warhead Program is a multinational cooperative development effort begun under a 1983 Memorandum of Understanding signed by the United States, France, Germany, and the United Kingdom. The GAO found that MDTT, Inc., is an internationally staffed corporation, which is wholly owned by the four national prime contractors. The GAO noted that MDTT, Inc. is the managing partner for the Joint Venture. The GAO found that, under the Memorandum of Understanding provisions, the United States is to pay 40 percent of the program development cost, and France, Germany, and the United Kingdom are each to pay 20 percent. The GAO also noted that, on the basis of a September 1991 Defense Department estimate, the development program will have cost a total of approximately $660 million by the end of the System Demonstration Substage (U.S. share--$300 million; European share--about $360 million). The GAO observed that, by that time, the U.S actually will have paid about 45 percent of the development costs. The GAO also found that, if the U.S withdraws from the program at the end of the System Demonstration Substage, the disproportionate cost allocation will not be corrected and the U.S will have borne a greater share of the cost than required. The GAO also reported that the Memorandum of Understanding limits the development work to be done in the U.S. under the prime contract to a maximum of 34 percent of the total development work. The GAO found that, despite the unequal distribution of the costs, at the beginning of the program the quality development work was distributed with the intent of equal quality work shares. The GAO noted that an MDTT work share quality rating system shows the U.S. having 22.8 percent of the quality work. Report figure 1 shows the division of development work for the Multiple Launch Rocket System Terminal Guidance Warhead and figure 2 shows the division of development work for the terminally guided

Now on pp. 1, 3-7

submunition. (pp. 1-2, pp. 5-9/ GAO Draft Report)

DOD POSITION: Partially concur. The GAO comparison of the approximate U.S. cost to complete development ($300 million) compared to the European cost ($360 million) is listed in escalated dollars. As stated in the GAO report, the Memorandum of Understanding requires each country's contribution to its cost share to be calculated by deflating each contribution to a constant 1984 base year and converting European currencies to dollar using the 1984 exchange rate. Using that methodology, the U.S. cost share for work completed at the end of fiscal year 1990 was 43 percent of the total development cost as compared to the 45 percent listed in the draft report. When cost share data for work completed at the end of fiscal year 1991 becomes available, it will be evaluated and, if a discrepancy still exists, the program management office will pursue efforts to equalize cost shares, as provided for in the Memorandum of Understanding. As stated elsewhere in the report, the Memorandum of Understanding provisions requiring the use of the 1984 economic baseline and exchange rates have favored the U.S., due to the relative decline of the dollar to European currencies. Additionally, it should be noted that all funding has been used for U.S. work, whereas over $30 million of European funding has been used for work done by U.S. industry.

See p. 4

The GAO is correct that the Memorandum of Understanding limits the U.S. development work share under the prime contract to 34 percent of the total development work even though the U.S. contributes 40 percent of the cost. The remaining U.S. funding above the 34 percent prime contract limit pays for all Multiple Launch Rocket System integration efforts under a separate contract, as well as U.S. test facilities utilization, technical support from DoD laboratories, and all Terminal Guidance Warhead program management office costs at the U.S. Army Missile Command. As stated previously, all U.S. funding is being used for U.S. work.

The GAO reports that the U.S. has only been assigned 22.8 percent of the total quality development work based on the MDTT rating system, lowest of the four participating countries. In 1984, quality development work was distributed with the intent of equal quality work shares. Because of the difficulty involved in distributing exactly 25 percent of the quality work shares to each of the four countries and the highly subjective nature of the rating system, and the fact that the U.S. work share included development of both the millimeter wave

See comment 1.

transmitter (the most unique and technically challenging component of the program), as well as the target detection and tracking algorithms, the Army accepted the MDTT Inc proposal for a U.S. quality work share distribution of 22.8 percent. The U.S. contractor, Martin Marietta, also concurred with the distribution.

o **FINDING B: Memorandum of Understanding Provisions on Technical Data Rights, Termination, and Exchange Rates**. The GAO reported that a significant number of the Multiple Launch Rocket System Terminal Guidance Warhead technologies involve the use of "background limited rights data". The GAO found that, if the DoD wants to apply such data outside the program, and the claims are validated, the contractors may require payment of non-recurring fees or recurring royalties for use of the data. The GAO noted that, according to DoD officials, the limited rights data provisions of the Multiple Launch Rocket System Terminal Guidance Warhead Program reflect standard practice. The GAO nevertheless observed that decision makers should be aware of the potential cost implications when considering the application of the data to other missile systems.

The GAO further reported that the Memorandum of Understanding provision on termination also could prove costly, if U.S. participation in the program is terminated before completing the System Demonstration Substage. The GAO found that the terminating government would be obligated to continue paying its share of the development effort for another 270 days. The GAO noted that issue was raised during congressional consideration of the DoD reprogramming request to continue the Multiple Launch Rocket System Terminal Guidance Warhead through the System Demonstration Substage. The GAO observed that the Department calculated terminating U.S. participation at that time would have cost the United States $36.4 million.

In addition, the GAO reported that exchange rates and economic baseline for the Multiple Launch Rocket System Terminal Guidance Warhead development program are fixed at January 31, 1984 levels by the Memorandum of Understanding. The GAO found that the agreement provides for changing the reference conditions only at transition to the maturation/ full-scale development stage (projected for 1993). The GAO also found that the 40 percent U.S. contribution is still valued using 1984 exchange rate--and, because the European partners have to translate their expenses back to the 1984 exchange rate, their cost share contributions appear understated. The GAO noted that, since April 1988, the Europeans have sought relief from

the exchange rates and the baseline economics, but the Army did not accede to the European requests and, thus, avoided increases in U.S. payments.

The GAO concluded that some of the cited factors should be considered (1) in deciding whether to continue the Multiple Launch Rocket System Terminal Guidance Warhead Program and (2) in negotiating future Memoranda of Understanding. (pp. 4-5, pp. 10-12/ GAO Draft Report)

Now on pp. 1, 2, 8, 9.

DOD POSITION: Partially concur. As stated in the GAO report, payment of nonrecurring fees or recurring royalties only applies to "background limited rights data" claims that are validated and are used outside of the Terminal Guidance Warhead program. However, the majority of Terminal Guidance Warhead technology is "foreground technology," developed as part of the Terminal Guidance Warhead program--and, as such, could be used in other DoD programs without additional cost, regardless of the country in which it was developed. At any rate, limited data rights policy is not so much a Memorandum of Understanding issue, but a procurement practice common to most U.S. Defense programs because of the prohibitive cost of negotiating rights in advance for data or technology that may or may not be used in the final configuration.

See comment 2

The GAO correctly reports that U.S. withdrawal from the Terminal Guidance Warhead program prior to System Demonstration Substage completion would have obligated the U.S. to continue paying its share of the development effort for an additional 270 days at a cost of $36.4 million. The provisions of the Memorandum of Understanding that require continued payment after a country's notice of termination were included to protect the remaining countries and to minimize instability in what is a highly complex, industrially interdependent effort. Allowing any country to withdraw immediately from the program without penalty would have resulted in an unacceptable cost and schedule risk for each of the partner countries and their contractors. That was one of the main reasons the DoD and the Army strongly opposed initial congressional guidance, which would have required the U.S. to withdraw from the program in March 1991.

See p. 8

The GAO is correct that the Army has not agreed to European requests for early relief from the 1984 exchange rate and baseline economic provisions of the Memorandum of Understanding that have favored the U.S. due to the relative decline of the dollar compared to the European currencies. The DoD position on the Memorandum of Understanding is explained in the DoD

response to the recommendation.

o **FINDING C: Third Country Transfers May Not Adequately Protect U.S. Interests.** The GAO reported that partner nations, which are developing most of the components, may unilaterally transfer technical data developed in their own countries to third countries without the approval of the United States or other partner nations. The GAO observed that contrasts with the provisions for the basic Multiple Launch Rocket System Program, which required all such transfers to be approved unanimously. The GAO concluded that the third country transfer authority may not protect U.S interests. (p. 3,p. 13/ GAO Draft Report)

Now on pp 2, 9, 10

DOD POSITION: Nonconcur. While the DoD agrees with the GAO conclusion that partner nations may unilaterally transfer data on components developed in their own countries, it is the DoD position that the U.S. interests are adequately protected. First, the Memorandum of Understanding requires U.S. consent to such transfers if the component incorporates any background information provided by the U.S. Hence, it does not permit unrestricted transfer of U.S. technology. Second, the provision operates to the benefit of the U.S. The most unique and technically challenging component of the Terminal Guidance Warhead program is the millimeter wave transmitter developed by TRW. The Memorandum of Understanding provision allows the U.S. to retain unilateral control over transferring that technology to third parties. The certain benefit of controlling the millimeter wave technology clearly outweighs the speculative benefit of exercising control over lesser technologies developed in partner countries.

See p. 11.

o **FINDING D: Memorandum of Understanding Requires Release Of Technology If Microwave Millimeter Wave Monolithic Integrated Circuit Is Introduced.** The GAO reported that, under the Memorandum of Understanding, if a country introduces a new technology during the Multiple Launch Rocket System Terminal Guidance Warhead development phase, it must be provided to the partner nations. The GAO found that provision could affect a separate U.S. development effort--the Microwave Millimeter Wave Monolithic Integrated Circuit. The GAO noted that, although Defense Department officials stated the cited design and manufacturing technology should not be released to foreign countries due to national security and competitiveness concerns, the Army Missile Command is considering introducing Microwave Millimeter Wave Monolithic Integrated Circuit hardware to enhance the Multiple Launch Rocket System Terminal Guidance Warhead Program. The GAO observed that, if the

Now on pp. 2, 3, 10.

technology is introduced during the Multiple Launch Rocket System Terminal Guidance Warhead development phase, the Memorandum of Understanding provision would require the U.S. to transfer design and manufacturing technology to the partner countries as well. The GAO noted that, according to project officials they intend to require a waiver of those provisions before Millimeter Wave Monolithic Integrated Circuit hardware is introduced. (pp. 3-4, pp. 13-15/GAO Draft Report)

See pp. 11, 12 and comment 3.

DOD POSITION: Nonconcur. The GAO concludes that design and manufacturing technology would have to be transferred to the Terminal Guidance Warhead European partners if the Microwave Millimeter Wave Monolithic Integrated Circuit was introduced into the program. The DoD disagrees with that interpretation of the Memorandum of Understanding. Paragraph 7.3.2.2 provides that "each participant will ... make available to the others such technology and related industrial property rights for use without payment in the Terminal Guidance Warhead project, as **it holds and agrees to be necessary** for the development project and the establishment and utilization of the required production capabilities for the Multiple Launch Rocket Systems Terminal Guidance Warhead." The DoD agrees that design and manufacturing technology could be transferred under the provision, but it would be at the discretion of the U.S. and not mandated, as the GAO concludes. The DoD does agree, however, that, if Microwave Millimeter Wave Monolithic Integrated Circuit technology is to be introduced into the Terminal Guidance Warhead program, it should be preceded by an unequivocal acknowledgment from the partners that design and manufacturing technology will not be transferred. That would preclude any potential future misunderstanding about the availability of the technology.

RECOMMENDATION

o **RECOMMENDATION**: The GAO recommended that, to avoid being required to share introduced Government-owned technologies, the Secretary of Defense direct the Army to withhold introduction of Millimeter Wave Monolithic Integrated Circuit technology to the Multiple Launch Rocket System Terminal Guidance Warhead Program until (1) the United States obtains an unanimously agreed upon waiver of provision 7.3.2 of the Memorandum of Understanding, (2) the completion of Multiple Launch Rocket System Terminal Guidance Warhead development, or (3) termination of U.S. participation under the development Memorandum of Understanding. (p. 15/GAO Draft Report)

See pp. 11, 12 and comment 3.

DOD POSITION: Partially concur. Since the DoD does not agree with the GAO conclusion that provision 7.3.2 of the Memorandum of Understanding would require the U.S. to transfer Microwave Millimeter Wave Monolithic Integrated Circuit design and manufacturing technology if the component is introduced into the Terminal Guidance Warhead program, the DoD also does not agree that a "waiver" of the provision is required. However, the DoD concurs with the Army and the U.S. Army Missile Command position that, if a decision is made to introduce Microwave Millimeter Wave Monolithic Integrated Circuit technology into the Terminal Guidance Warhead program, it should be preceded by an unequivocal acknowledgement from the partners that design and manufacturing technology will not be transferred--to preclude any future misunderstanding about the availability of this technology. The DoD considers tht such advance acknowledgment meets the intent of the GAO recommendation.

See p. 12.

To restate the point made in the accompanying letter, by necessity, any Memorandum of Understanding is a compromise of terms and conditions that have been agreed to be acceptable by all parties involved. While some of the provisions of the Memorandum of Understanding may be perceived to favor the European partners, other provisions, such as the 1984 exchange rate and economic baseline, have favored the U.S. The GAO implies that the U.S. was negligent in negotiating the Memorandum of Understanding. However, if the U.S. insisted on having the advantage on every issue during Memorandum of Understanding negotiations, few, if any, international development programs would be initiated with the U.S. as a partner.

The following are GAO's comments on the Department of Defense's letter dated February 24, 1992.

GAO Comments

1. The quality of the development work on the millimeter wave transmitter and the algorithms was included in MDTT's measure of the quality of the work share. If they had not been included, the measure of the quality of the U.S. work share would have been lower than 22.8 percent.

2. The Department of Defense states that "the majority of Terminal Guidance Warhead technology is 'foreground technology'." However, the Defense Department was unable to describe how it quantified the TGW technology to show that "the majority" of it is foreground information. The MLRS TGW master technology list contains a listing of 116 technologies that have been involved in the program. There are background limited rights data claims on 65 percent of these technologies.

3. The intent of all participating nations being provided the information necessary to manufacture MLRS TGW and its components is found in paragraph 7.2 of the MOU. This paragraph states "It is the objective of the Participants to acquire rights of use and to transfer technical information and patents necessary for each Participant, at its option, to develop and ultimately have produced by its national industries the MLRS TGW, its subsystems and components, or other weapons systems." Since manufacturing technology is the key to MIMIC, if MIMIC is incorporated into MLRS TGW it will be necessary to release this information to the other participants to meet the objective of enabling each participant to produce MLRS TGW. Further, paragraph 7.3.2.2 states

"It is recognized that the TGW development may make use of components and technologies developed in other projects by the agencies of the Participants ... Accordingly each Participant will ... make available to the others such technology and related industrial property rights ... as it holds and agrees to be necessary for the development project and the establishment and utilization of the required production capabilities for the MLRS TGW."

The Defense Department commented that this paragraph gives the United States discretion as to whether technologies introduced to MLRS TGW need be released. However, a strong argument exists that the United States would not introduce MIMIC to MLRS TGW unless it was considered "necessary for the development project and the establishment and utilization of the required production capabilities." Such an introduction would require additional testing, and it is doubtful this cost would be

incurred unless the introduction of the technology was deemed necessary. A MIMIC project official has also stated that a portion of the French MLRS TGW work share "is not producible" without MIMIC since manufacture of the item as it is currently designed will be very time consuming, difficult, and costly. If MIMIC is introduced to the development program and is necessary to establish a production capability for MLRS TGW, the United States could be required to release the design and manufacturing technology to the partner nations unless the United States obtains an unanimous agreement or waiver from them to avoid the technology transfer provisions of paragraph 7.3.2.2.

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